

FACTORS INFLUENCING A U.S. POSITION
IN A
FUTURE LAW OF THE SEA CONFERENCE

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Agreement to convene a conference on the law of the sea in 1973 was among the last items decided at the fall, 1970 session of the UN General Assembly (1). According to Resolution 2750 C(XXV), the conference will consider, "international machinery, for the area, and resources of the sea bed and the ocean floor and the subsoil thereof beyond limits of national jurisdiction, a precise definition of the area, and a broad range of relative issues including those concerning the regimes of the high seas, the continental shelf, and territorial sea (including the question of its breadth and the question of international straits) and contiguous zone, fishing, and conservation of the living resources of the high seas (including the question of preferential rights of coastal States), the preservation of the marine environment, (including inter alia the prevention of pollution) and scientific research". The preparatory work of the conference is assigned to an enlarged (86 member) Committee on Peaceful Uses of the Sea Bed and Ocean Floor beyond Limits of National Jurisdiction.

The resolution essentially reopens most, if not all, of the topics in the four law of the sea conventions agreed to at the first law of the sea conference in 1958. Apparently the U.S. had hoped to discuss the various law of the sea matters in some kind of sequential order (2). This now appears unlikely.

The prospect of a law of the sea conference requires the U.S. to develop positions on a number of issues, seldom an easy task for any country at any time, and particularly difficult for the U.S. because of the nature of the issues, the forces at play within the U.S. and the rapidly changing technological and sociological problems in the world community and the U.S. role in that community.

It is my purpose in this paper to examine the various issues and forces which will shape the U.S. position and to outline possible elements of a U.S. position.

The U.S. forces determining ocean policy can be ordered in a variety of ways. I have listed them in terms of the contending power groups. There are few interests in the U.S., legitimate or otherwise, that are not represented by either a Washington lobby or a federal agency, and it is often easier to discuss the interests of these contending forces than it is to discuss the law of the sea under a more abstract listing of forces. In either case the end result of the discussion should not differ significantly.

The impetus for this paper came from an attendance at two recent meetings of the Intergovernmental Oceanographic Commission (IOC) of UNESCO (3) where I was impressed by the degree to which marine science has become enmeshed in the maneuvering now beginning with respect to this new conference. I was also made painfully aware that marine science ranks low in the priorities of most countries, particularly the LDC's, and that the interests of oceanographers in this country run contrary to the interests of some very powerful groups within the U.S.

I am an amateur in most of these matters and admit it is presumptuous for an outsider to assess the best interests of a given group. Although I have tried to be objective, it is difficult to remove personal bias. More damaging is the possibility that important considerations may have been overlooked or insufficiently understood. If, however, this attempt at a tour de force has the effect of broadening discussion on these matters at this important time, it will have served its purpose.

DEPARTMENT OF DEFENSE

Of all the forces at play in developing the U.S. position, DOD looms the largest and most formidable. Military security can be expected to be first in any ranking of U.S. priorities. It can be expected that the DOD will hammer out a single position on any issue, but it is also clear that there must be contending forces within the DOD. Traditionally, the Navy has always opted for a minimum territorial sea and maximum freedom on the high seas. Although one need expect no change in this position in the future, it is less clear that the DOD case is as strong as it once was.

Physical security is of several kinds. The military often discusses possible future situations in terms of scenarios. I have adopted a similar procedure in considering the military interests in the law of the sea in terms of nuclear deterrent, gunboat diplomacy and limited wars, and something in between, which, for lack of a better phrase, I call conventional warfare.

Nuclear Strike Force: The U.S. currently has 41 missile carrying nuclear submarines each of which can launch sixteen intermediate range ballistic missiles, the Polaris. Polaris carries about a one megaton warhead and has a range of up to 2500 miles. Several submarines are presently being refitted for the Poseidon missile, a multiple independently targeted re-entry vehicle (MIRV) capable of carrying ten weapons in the 50 kiloton range to separately programmed targets (4). The range of the Poseidon missile is somewhat greater than that of Polaris. Some 31 of the Polaris submarines are scheduled to be refitted as Poseidon missile launchers.

The missile launching submarine is the Navy's only entry in the U.S. nuclear strike force. Our nuclear deterrent does not include carrier launched bombers carrying nuclear bombs. Some surface ships, submarines and carrier aircraft have or can be outfitted for tactical nuclear weapons. The proposed sea bed treaty before the U.N. Conference on Disarmament will limit the fixed installation of nuclear weapons to within twelve miles of the coast. It seems unlikely that fixed nuclear weapons installations of any kind are the path of the future since an argument against the major U.S. nuclear deterrent, the one thousand Minutemen, is that they are fired from fixed installations. The increasing accuracy of the ICBM's the advent of MIRV, and the general pessimism about building an acceptable ABM screen have brought some experts to the opinion that future missile development will rely even more heavily on mobile platforms (5). Attempts to develop mobile launching sites on land using railroad cars and trucks have been abandoned for political as well as technical reasons (5).

In summary, the missile launching submarine is a very important part of the country's nuclear arsenal and it seems likely that its relative importance will grow rather than lessen. Although submarine configuration may change (one could imagine bottom crawling missile launchers for example), it is doubtful that surface vehicles will ever play an important role in nuclear war. They are too vulnerable and too expensive. A possible future exception would be the use of very large floating airports for long range bombers. Although considerably more expensive than land based facilities, they have the advantage of being far removed from civilian populations. More and more, such first strike targets as Minuteman sites and SAC bases are being considered less than desirable by the neighboring populations. The U.S. has advance bases for its nuclear submarines in Holy Loch (Scotland), Rota (Spain), and

Guam. Suggestions have been made from time to time that all nuclear weapons including the necessary advanced bases be placed in the oceans (6). Any consideration of U.S. military interest in a law of the sea conference should not overlook this possibility.

The major concern of the nuclear submarine navy is to maintain maximum maneuverability. This implies complete freedom of movement on the high seas, a narrow territorial sea and the insurance that any revision of the continental shelf convention will not limit submarine movements over that part of the continental shelf that extends beyond the territorial sea. The nuclear submarine argument for a narrow territorial sea is not based on the advantage of being a few miles closer to shore. Even a 200 mile territorial sea would not pose a major problem if its only effect was to increase the range by that amount. With a missile range of 2500 miles, submarines on station in the Arctic, Indian, Atlantic, Pacific and Mediterranean can reach nearly any target in Europe or Asia. The Navy has on the drawing board plans for an Underwater Launching Missile System (ULMS) capable of sending Poseidon type missiles 6000 miles. Submarines with such a system could hit targets anywhere on earth while ranging the Atlantic and Pacific.

The real concern for a narrow territorial sea relates to straits and narrow seas which would either be closed to nuclear submarines, or which would require the submarine to traverse the passage on the surface. There may be some disagreement about what rights warships have concerning passage through territorial seas, but the 1958 territorial sea convention is explicit on the point that submarines must travel on the surface and fly the flag. For example, unless it were separately negotiated, a 12 mile territorial sea would require submarines to pass on the surface through the Straits of Gibraltar which is 8 miles wide. At present U.S. ballistic missile submarines run submerged during their entire patrol including passage through such international straits as the Straits of Gibraltar. This is perhaps a fairly good indication of the present state of the USSR submarine surveillance capability since it would certainly be easier and safer to go through those narrow and busy straits on the surface and submerge on the other side. Radio contact is maintained by the submarine trailing an antenna within 30-40 feet of the surface. The submarine itself can travel in excess of 30 knots.

Some years ago the Navy determined that 116 straits would be effected by a change from a 3 mile to a 12 mile territorial sea (7). Most of the straits, of course, are of little importance to a nuclear submarine fleet in that alternate routes are available. However, a 12 mile territorial sea without some agreement about free transit through at least some straits would not be in the best interests of the missile launching submarine navy. Whether free passage should include the right to pass submerged, is less obvious. Although the advantage of submerged passage is apparently real today, it may not remain a major advantage indefinitely. As better sonar systems are deployed it becomes less likely that either U.S. or U.S.S.R. submarines can pass through narrow straits without detection. However, there may be some advantage to limit knowledge of such passages to those nations with the technical and economic capacity to mount such monitoring systems. At such time as the Navy develops a 6000 mile missile (ULMS), submerged passage through straits and narrow seas will be of less significance to the ballistic missile submarine.

However, it is important for the nuclear strategy of both sides that submarines stay submerged once on station. If a submarine's position is known, the submarine can be easily destroyed in any first strike nuclear attack.

A 12 mile territorial sea that allowed for free transit through narrow straits would not be restrictive, but a 200 mile territorial sea could pose a problem. A 200 mile territorial sea closes off the Mediterranean, the Baltic, the Sea of Japan, the South China Sea and all passages to the Arctic, as well as the Caribbean and the Gulf of Mexico. With the development of ULMS, closure of these areas would be less critical since presumably ULMS submarines would be kept close to home where logistics and communications would be easier. A 200 mile territorial sea closes the U.S.S.R. off from direct access to the Atlantic.

The other side of the nuclear deterrent problem is detection. It is in the best interests of the U.S. to be able to keep track at all times of the position and movement of all missile carrying submarines. This is done primarily by sonar. All long range detection (more than 100 miles) is done by listening (passive sonar). Echo ranging equipment (active sonar which is the underwater acoustical equivalent to radar) is carried aboard submarines and surface ships. It is used for closing in on a target and for aiming weapons. Echo ranging from fixed locations is possible. For example, it may be used effectively in narrow passages through which submarines must pass. It is possible to imagine that large active systems with much longer ranges might be developed in the future for use from fixed positions in the open ocean, but at present, all operational long range detection systems are passive and are built on the principle of detecting the sounds emitted by the submarine. For maximum ranges such equipment must be in deep water. Sound travels very well in the deep ocean. A sonar off Bermuda detected the sound of a 300 pound charge of TNT exploded near its antipode off Australia (8). One of the reasons for the efficiency with which sound is transmitted is the existence of a deep sound channel which focuses sound energy. The depth of the sound channel varies continuously from nearly the surface in high latitudes such as off Norway to depths of 2000 meters off Portugal. The average depth of the sound channel is deeper in the Atlantic than the Pacific. In the case of the shot heard round the world, both the explosive and the listening device were in the sound channel. One cannot, of course, count on submerged submarines traveling at the depth of the sound channel, but it is a distinct advantage to have the listening system in the sound channel.

Ideal listening sites are islands where there is deep water close to land and a large expanse of deep ocean beyond. Cables can be run back to the beach and the equipment monitored on shore. All listening arrays are tied to the surface. Usually the shore power is supplied from the surface and the information gathered is transmitted by radio to a central location. Thus, it is difficult to run such devices in a clandestine manner off the coast of a neutral nation.

In principle permanent listening arrays could be moored in the open ocean or floated from a surface buoy and the signal transmitted to ship, shore or satellite by radio. Helicopters employ such systems today for very short range detection by dropping instruments within a few miles of a suspected submarine and having the sounds picked up by the surface floating sonobuoy and radioed to the plane.

Presumably the Navy does not want anyone tampering with its listening equipment. On the high seas, it has no recourse other than standing guard with a ship and indicating that tampering would be considered an unfriendly act. It is probably easier to protect this equipment if the entire system

Is within the territorial sea. Perhaps the continental shelf convention might be used as an argument to keep others from working near the bottom mounted equipment beyond the territorial sea but within the jurisdiction of the shelf convention. It would seem that those charged with the task of maintaining surveillance of enemy submarines would prefer a new territorial sea convention or at least a continental shelf convention that extended seaward to a depth of at least 2000 meters. I am of the opinion, however, that for the present at least, the Navy is capable of protecting its own equipment (from man, if not from nature) with or without an extension of the territorial sea or continental shelf width.

Another possible consideration is the use of ships for detection of land launched missiles and as antiballistic missile sites. Clearly there are advantages to detect a missile quickly and to launch the ABM as near to launch point as possible. Such a Sea Based Anti Ballistic Missile System (SBABMS) has been suggested, and a limited research and development effort is underway. Even if SBABMS were to be important today (and fully recognizing the pitfalls in arguing by analogy in such a complicated field as this) I cannot help but question whether the difference of a few miles will be so important tomorrow. Improved technology made the mid ocean radar picket ships of the fifties obsolete in 1965 (4).

Gunboat Diplomacy and Limited Wars: A second kind of physical security is the U.S. ability to exert pressure on coastal states, and if necessary, to fight a limited war. Although our experience in Viet Nam is causing serious rethinking of U.S. policy, it seems unlikely that the U.S. is prepared over either the short or long term to give up its ability to show the flag off the coast of any nation and to move men and equipment quickly from one position to another. With a three-mile territorial sea, showing the flag has a different emotional impact than a 12-mile limit. At three miles everyone can see the ships from the beach. At 12 miles you need a hill and strong binoculars. Once you have moved your ships beyond visual contact there would appear to be little difference in the psychological impact on the coastal government, regardless of the distance the ships were kept offshore by the width of the territorial sea.

The U.S. has several options concerning the problem of strategic mobility. At the one extreme it can keep forces overseas in a number of areas. The mere presence of the forces is a deterrent. At the other extreme it can keep all of its forces at home, ready to be air or sea lifted as necessary. The latter requires the smaller standing force and is certainly the least expensive. There is also evidence that it is often both easier and faster to move men from the U.S. to any part of the world than to move them shorter distances from advanced bases in foreign countries (9). Finally it must be noted that there are fewer and fewer countries where the U.S. can maintain advance forces.

In the initial stages of applying pressure on any country whose actions are such that the U.S. is considering military action, there is considerable advantage to the use of ships rather than airplanes. It is much more impressive to have elements of the Sixth Fleet move into position than to put the 82nd Airborne Division on alert either in the U.S. or at an advance base. Furthermore, there is more flexibility with a ship which can stay at sea for long periods and diplomatic pressure can be applied gradually. Once a transport plane is in the air it has to land somewhere in a few hours. Permission to land on nearby neutral soil can be difficult and the decision to land on enemy soil is not one to be made lightly.

However, once a decision is made to move men into a country, the airplane can do the job faster than the ship. The problem is in providing logistic support. Even the new C-5A is limited to about 100 tons of payload in transocean flights. Although this is an incredible load for an airplane, planes can make but a minor contribution to supplying sustained military activity. Any military activity that lasts in a country for more than a few weeks will be extremely difficult without sea transportation. The 1958 airlift of 2000 men into Lebanon was accompanied by 25 supporting ships. In Korea 270 tons were transported by ship for every ton carried by air (10). However, assuming a secure sea route is available, the length of the route is a comparatively minor factor after the first few weeks. The problem is not how long the route, but whether military transports can get there without passing through the territorial sea of one or more neutral nations, and if not, the extent to which such passage is "innocent". Once a quasi-steady state situation has been established, the quantity of goods reaching its destination is equal to that leaving the U.S., regardless of the length of the passage. The only difference is the additional mileage cost.

The extent to which the territorial sea convention can be invoked to forbid military transport through territorial seas is debatable. The convention reads "passage is innocent so long as it is not prejudicial to the peace, good order or security of the coastal state". Warships can and have been excluded. Perhaps military transports carrying troops can be kept out. Can transports carrying military supplies be forbidden?

A 200 mile territorial sea which would close off such areas as the Mediterranean would pose a major problem to the U.S. concept of strategic mobility. It may be true that the U.S. will move her ships wherever she wants to in time of war. It is much less clear that she would pass through the territorial sea of a neutral country during a Middle East crisis if that country indicated its displeasure. For example, even if the U.S. could have secured rights of passage from sufficient countries to have moved warships from Italy to off Jordan as she did in the fall of 1970, it would have required time and reduced the flexibility of the U.S. response. Perhaps, most important of all, the necessity of applying diplomatic pressure to acquire permission to move ships through other nations' territorial seas would have automatically escalated the nature of the U.S. response.

Conventional Warfare: The conventional role of the Navy has been to keep the sea lanes open to allied shipping and to deny the use of the seas to the enemy. Seldom are wars decided by a single naval battle as in the defeat of the Persians in the Battle of Salamis or in the defeat of the Spanish Armada. Victory in the Battle of the Atlantic in World War II meant that men and equipment could be moved to the European mainland where the decisive battles were fought. Similarly, the defeat of the Japanese Navy in the Pacific allowed the U.S. to island hop its way toward Japan, denying supplies to those Japanese forces left behind, and developing a partial blockade of the Japanese mainland. Victory or defeat at sea may often predetermine the outcome of the land war, but the decisive battles themselves have usually been fought on land.

There are many who question whether the concept of conventional war has any relevance today. They argue that the consequences of a nuclear war are so disastrous that all future encounters between nuclear powers will be fought on the basis of using the least amount of force to secure one's goals rather than by concentrating the maximum amount of force available, which is what one would expect in conventional warfare.

nitude of World Wars I and II would be inherently unstable and would lead almost immediately to nuclear war. Some argue that since conventional war is unlikely, there is no need for a Navy geared to fight conventional wars. Today's Navy should consist of Polaris submarines as a nuclear deterrent and supply ships and the variety of mine sweepers and other small craft necessary for such limited wars as Viet Nam and Korea. The counter argument is that if future wars are to be fought on the basis of committing the minimum forces necessary to achieve its objectives, the U.S. needs a Navy which can provide maximum flexibility. Certainly a Navy consisting of only Polaris submarines and mine sweepers would have limited the possible U.S. responses during the Cuban missile crisis.

The "flexible response" argument is persuasive. Until such a time as there is a conscious decision to restrict the Navy to its two obvious roles-- nuclear strike force and support for limited wars--it would seem prudent in any discussion of the Navy's stake in a future law of the sea conference to assume that the traditional naval roles remain. Thus convoy protection, blockade of enemy ports, and fleet actions must be considered. It does not mean, however, that future conventional wars will be fought in the manner of the past. In my opinion, the spy satellites and the homing missile (either air, land, or ship launched) have combined to severely limit, if not end, the usefulness of the surface warship. Any system that can provide the intelligence information attributed to present satellites can surely keep track of all relatively slow moving surface ships. Surprise and evasion have always been a major factor in naval action. In the future this can only be done by staying hidden below the surface.

In reviewing the possible ways the Navy would use the ocean in the variety of situations between nuclear and limited war, I have been unable to think of important ways in which the Navy's interest in the law of the sea will differ from those already indicated. In a large conventional war, the Navy might be expected to worry less about violating a neutral's territorial sea with their surface ships or submarines, but I do not see this as a very strong argument for indicating that the Navy does not care about the width of the territorial sea and the fate of narrow passages and seas. Perhaps the reverse argument is true, however: any law of the sea agreements which will satisfy the Navy's requirements in a limited war--gunboat diplomacy situation--will be adequate to the Navy's needs in conventional war.

Military technology is continuously changing and one should not end this review without trying to forecast the Navy's needs for the future. Although it is difficult to imagine all the ways naval technology may develop, let me indicate two. The first is the manned habitat on the ocean floor and the second is the floating airport. We are not in a position to deploy manned habitats on the ocean floor today, but we probably could have been if the Navy had thought it important enough a decade ago, and we could probably do it in another decade if we devoted the resources to it. I'm not certain what military purpose such a habitat could or would serve. Perhaps the Navy isn't either, which may be why the past effort has been so small. Although the continental shelf convention is quiet on the subject, I suspect it would be invoked if we or any other country deployed such military habitats off the coasts of other nations outside the territorial sea, but in depths shallower than 200 m. Thus, for situations of this kind the high seas do not begin at the edge of the territorial sea, but at the edge of the continental shelf, and any redefinition of the continental shelf which extends it further seaward would also affect the placing of manned habitats.

We may be in greater military need of floating airports than of manned habitats. As our advanced air bases are closed down in one country after another the idea of building a floating airport becomes increasingly attractive (6). Although free floating, it may be desirable to anchor the airport in some manner. If this happens, will the position of this floating airport be determined by the territorial sea or by the continental shelf? If it is the latter, and the edge of the continental shelf is redefined to 2500 m, will anchoring be feasible in these depths?

Conclusion: The major arguments of the past for narrow territorial seas have been based on showing the flag and the need of moving men, equipment and supplies quickly and easily. In my opinion, if the Navy could get agreement on free transit through certain straits and narrow seas, it would make comparatively little difference to current military strategy and tactics what was decided about the width of the territorial sea and the continental shelf. I am assuming that there will be no change in the high seas convention which would limit present military activity.

Perhaps the strongest Navy arguments are based not on the present, but on the unforeseeable. Without knowing precisely what new technology may be available in thirty years, it would seem prudent for the strongest naval power in the world to continue to make the traditional strong naval power argument of maximum freedom of the seas. It is a compelling argument, but it remains to be seen whether an argument based on intuition rather than hard data can carry the day against the forces who wish to limit the freedom of the seas.

FISHING INDUSTRY

The fishing interests speak with many voices. Their views are dissimilar, and any U.S. position which attempts to reflect all of those interests will be a compromise. For purposes of the law of the seas, the U.S. fisheries interests can be broken into four groups: the food fish processing industry, the fish meal industry, and the fish catching industry, which for purposes of this discussion can be divided into coastal and distant water fisheries. By coastal I mean that part of the industry that fishes in international waters contiguous to the U.S., such as the New England and Northwest fisheries. By distant water fisheries I mean that part of the industry such as the tuna and Gulf shrimp fisheries which may at times fish in international waters contiguous to other coastal states. I do not wish to make any value judgements as to whether one segment of the industry is more important to the U.S. than another, but it does seem that the basis for such a judgement might be found in statistics such as the following taken from the FAO Yearbook of Fisheries Statistics and the U.S. Bureau of Commercial Fisheries Annual Summary (12). The U.S. presently ranks sixth in tons of fish caught, behind Peru, Japan, the USSR, the Peoples Republic of China and Norway. The 1968 U.S. catch of 2.4 million tons has changed little in the last thirty years. The main trend of the last 20 years is that where industrial fish accounted for 30% of the catch in 1950, it is now approaching 50% of the catch by weight. The U.S. consumption of food fish has remained constant at about 11 pounds per capita for at least the past fifty years, and can be compared with the really big fish eating nations: Japan at 67 pounds per person and the Scandinavian countries at about 45 pounds per person. The relative importance of fish as a source of food in the U.S. is somewhat greater than indicated since the U.S. also "consumes" about an equal amount of fish meal, most of which is fed to chickens who are very efficient converters of pounds of fish meal into pounds of chicken.

For some years now, the U.S. has been importing more fish than it produces, both food fish and industrial fish. For example, in 1969 the U.S. caught one million tons of food fish, including shell fish, and imported the equivalent of another 1.5 million tons (these and the following figures are in round weight or wet weight and are not to be confused with fish meal or fish consumed). With food fish the relative importance of imports has risen steadily over the past ten years at about 6-7% a year until in 1969 imports accounted for 60% of the fish consumed in the U.S. U.S. imports of fish meal are dependent upon relative costs of other protein sources, but imports have accounted for more than 50% of the industrial fish consumed in the U.S. since 1962 and in 1968 reached a record high of 84%. They were down to 67% in 1969. In 1969 the total value of fish products imported into the U.S. was about 844 million dollars compared to just under 104 million dollars in exports. The U.S. has the largest fisheries balance of payment differential in the world. Regarding the two U.S. distant water fisheries, tuna and shrimp, the U.S. imported slightly more shrimp than it caught in 1969 in spite of a growing U.S. shrimp fishery; although U.S. tuna canneries processed 85% of the tuna eaten in the U.S. in 1969, less than half of that processed was caught by U.S. fishermen.

It is difficult to find a simple yardstick to compare fisheries. For example, in 1967, the last year for which detailed statistics are available, the U.S. menhaden fishery was responsible for 28% of the 2.4 million tons U.S. catch and at that it was down almost 50% from its record catch of 1962. On a tonnage basis it is more than three times the size of the next largest fishery. However, menhaden are an industrial fish and the fishery itself accounted for only four percent of the 440 million dollars worth of fish caught in 1967. Shrimp on the other hand account for less than eight percent of the catch by weight, but the shrimp fishery brought in more than twice as much money to the fisherman as its nearest competitor, the salmon fishery. These are gross earning figures. The BCF estimates the value of fishery products in 1969 as follows: to fishermen, 519 million; value of imports, 844 million; to processors, 1,467 million.

Although the four different fishing interests may have different short term goals, I think they have at least a single long term goal in common, and that is the continued health of world fisheries in general, and of their own fishery or fish source in particular. In my view, and in the view of many others, world fisheries are heading for a major crisis within twenty years unless they are better managed. Estimates of available fish stocks vary, but a preponderance of experts suggest a maximum sustainable yield of 200 million tons a year, as compared with a 1968 catch of 64 million tons (13). This estimate contains two caveats: the first is that we limit our fish catching to the higher trophic levels and do not attempt a major harvest of plankton; the second is that we have not seriously underestimated the fishery possibilities in Antarctica. Apparently only the USSR is willing to make the investment at this time to determine the Antarctic fishery potential.

The world fish harvest has been increasing at six percent a year over the past twenty years, and if the growth rate could continue the catch will reach the magic number of 200 million tons by 1990. Economists have argued for some time that the present management practices for fish harvesting are inadequate to deal effectively with fisheries that are already being fished at or beyond maximum sustainable yield. The literature is replete with horrible examples of gross economic waste and the futility of capital investment for modernization when a fishery is viewed as a common property resource.

In which all can partake (14). It is easy to show that most of the recent growth in world fisheries has been dependent upon the development of previously unexploited fish stocks. Much of the recent growth has been in Industrial fish which during the last decade has grown from 16% to 37% of the total world catch. Several mature fisheries such as the North Sea-Baltic fishery have shown almost no growth in the last decade. If the prognosis of a 200 million ton maximum sustainable yield is approximately correct, then the world fisheries industry is going to be in difficulty in little more than a decade unless a different management philosophy is developed because there won't be any new areas to open up. Preliminary FAO estimates indicate a leveling off in the world catch for 1969, the first since World War II.

Many alternatives have been suggested, but nearly all have in common the objective of eliminating or at least minimizing competition for a given fisheries stock (15). If a fishing company or a fishing nation can be guaranteed complete control over a given fisheries, it can develop techniques for maximizing the annual harvest and for harvesting it as efficiently as possible, with the knowledge that its investment in R & D and in capital will be protected. As long as there is a fixed harvest, and no guarantee that others cannot enter the fishery, there is little incentive for major capital investment; and in fact, all who enter the fishery will approach the limit of zero excess profit regardless of investment (16).

Let us now consider the specific interest of the U.S. fisheries industry. The food fish processors have perhaps the largest stake in the maintenance of healthy world fisheries. The fish meal industry also has a strong interest in a healthy industry, but unlike the food fish business there are protein alternatives such as soy beans or dried milk for the fish meal in chicken feed. In fact, the year-to-year fluctuation in imports of fish meal is not a measure of the variability of the chicken feed business, but rather a measure of the relative cost of sources of certain amino acids essential to the diet of a chicken. If the fish meal industry should crumble, alternatives would be found. Clearly there are protein alternatives for food fish too, such as poultry, red meat or cheese. I believe there is a distinction, however. Food fish markets are dependent, at least in part, on individual preference. In this sense there is no substitute for fresh salmon as there are alternative sources of amino acids in chicken feed.

Because of balance of payment problems, problems of political stability in other countries, etc., it would be desirable if the fish used by the U.S. were furnished by U.S. boats, assuming costs were comparable; but the primary interest is a steady, reliable source at a low and relatively stable cost. It should also be noted that U.S. fish processing industries have an active interest in several foreign fisheries, including the Peru anchovy fishery, the largest volume fishery in the world today.

The primary problem of the U.S. coastal or distant water fisheries is to stay alive in a highly competitive business, and each can be expected to opt for a convention that favors its immediate problem. For a variety of reasons the U.S. coastal fishery industry has had a difficult time competing with boats from other nations for the available catch. Coastal fishermen would be in favor of extending U.S. jurisdiction out as far as possible. However, such an extension by others would eliminate free access to certain fishing grounds for the U.S. distant water fisheries. Therefore, the distant water interests prefer to keep national fishing zones as narrow as possible.

In my view the coastal fishery industry can more easily defend its position in terms of the problems of world fishery management than can the distant water fisheries. With the exception of whales and tuna, all major fisheries are conducted (or could be conducted) either in shallow water or very close to shallow water. Salmon is the other major fish caught in the open ocean, but since salmon are anadromous they could be caught, and caught much more efficiently, as they begin their run upstream.

It is not that fishermen have not looked for fish in deep water. New fisheries may be developed in the open ocean as technology improves. Krill fisheries or plankton fisheries are possible new sources of industrial fish. The development of new food fisheries is possible. However, there are sound oceanographic reasons why most fish are found either in, or close to, shallow water. Biological productivity is greater in shallow water and it can be expected that most new fisheries will be coastal fisheries in the sense that they are in, or close to, shallow water. The Antarctic ocean region may be a major exception.

In some sense all major fisheries today, except tuna and whales, are contiguous to a coastal state or states. Of course, a given fish stock may move up and down the coast and thus be contiguous to different states at different seasons or different years. I submit that it is easier to reach agreement on fisheries exploitation and management practices between the concerned coastal states, for example between Canada and the U.S. on the Northwest Atlantic and Northeast Pacific fisheries, and among Peru, Chile, and Ecuador on their great anchovy fishery, than it is to reach an agreement among many nations. I further believe such an agreement offers the best hope of developing rational management practices for what is a renewable but limited resource.

I do not claim that extended fishery's jurisdiction by coastal states will necessarily lead to rational management of world fisheries. The lack of success this country has had in such local fisheries as menhaden and scallop suggests that extended jurisdiction will not lead automatically to proper management. However, I do believe it is easier to find a series of regional solutions than a single world-wide one, if only because the number of participants are fewer and the self interests of the coastal states are usually clearer.

Nor do I mean to imply that the U.S. or any other coastal state necessarily has any historic claim to its offshore fisheries. If such an agreement were reached, it might be necessary to provide for a share of the revenue arising from these fisheries to be paid into an international fund, similar to that which has been proposed for high seas mineral exploitation. Neither is it necessary that the coastal states develop the fishery itself. It could lease the rights to one or more fishing countries.

The interrelationship of oil and mineral exploitation to fisheries is an additional reason for arguing that the fisheries off the continental margins should be in the control of the coastal states. When an offshore well gets out of control on the Gulf Coast and threatens to damage the 100 million dollars a year U.S. oyster and shrimp fishery, feelings run high, but suits and countersuits are decided in and out of the U.S. courts and the international implications are minimal. Canada and the U.S. will be granting oil exploitation leases shortly on the world-famous fishing grounds of the Northwest Atlantic. These areas are fished by boats from many nations and are among the most productive fishing grounds in the world. Any major oil blowout or similar disaster may have international consequences.

Other forms of conflict are less dramatic, but may cause at least as much tension. Although most Grand Banks fishing trawlers are small, their nets are not, and the maneuverability of a fishing boat with a tow is limited. Any offshore platform is an annoyance. The efficiency of the fishing fleet may be considerably reduced unless something equivalent of fishing fairways are established. If the compromise on the positioning of oil platforms is unsatisfactory, other fishing nations may argue (with or without justification) that the U.S. was too influenced by the requirements of the U.S. petroleum industry and paid insufficient heed to the needs of foreign fishing fleets which work the same area.

MINERAL INDUSTRY

Petroleum: The petroleum industry is the strongest and best organized of the U.S. industrial groups with an interest in the oceans. It was the petroleum industry which was in large part responsible for the Truman doctrine of 1945 that claimed the non-living resources of the continental shelf for the U.S. and led to the 1958 Law of the Sea Conference in Geneva.

The first modern offshore well was drilled in 1948. There are now in excess of 16,000 offshore wells in the U.S. alone, and drilling is underway in at least 28 countries (17). About 17% (6 million barrels a day) of the world's petroleum supply comes from offshore wells and it is estimated to rise to 33%, 25 million barrels, in another decade. Such a growth rate also implies, assuming other trends remain constant, that in fifteen years the world dollar value of offshore petroleum will be considerably larger than the world dollar value of fisheries. As of the moment the world value of fish landed is more than twice the value of crude oil from offshore drilling sites. Some 15 billion dollars has been invested to date, something more than half off the U.S. coast. Current expenditures on a world basis are on the order of three billion dollars a year. The technological growth has been extraordinary. Exploratory wells have been drilled in 400 meters of water, although there are no producing wells as yet in water deeper than 200m. Technological problems increase with depth, but they do not appear to be insurmountable. The pace of the seaward march will be determined by economics more than technology.

Petroleum is known to abound off many continental shelves. One estimate is 1,000,000 million barrels of petroleum and the equivalent of 350,000 million barrels of natural gas. The total proven offshore reserves are of about 52,000 million barrels of petroleum. There is good reason to believe that petroleum will be found on the continental slope beyond the shelf, and on the basis of geological evidence, considerably less reason to expect commercial quantities of petroleum on the continental rises and the deep ocean basin. What is of particular interest from a legal point of view is that there is good reason to expect petroleum deposits in a number of small oceanic basins such as the Mediterranean and Caribbean Seas.

Unlike the fishing interests, the oil industry speaks officially with one voice. Although it may be possible to find individuals and groups within the industry who hold contrary opinions, the current official view of the petroleum industry can be found in the 1969 report of the National Petroleum Council (18). In their opinion "National jurisdiction extends over the continental shelf, the continental slope, and at least the landward portion of the continental rise and the United States should promptly and forthrightly

assert these rights while recognizing similar rights of other coastal nations". Concurrent with this explicit recommendation is a somewhat more vaguely worded one to the effect that since "existing principles of international law are adequate to govern petroleum exploration and exploitation of the abyssal ocean floor for some time to come" no effort should be made at this time for establishing a more formal regime for high seas mineral exploitation.

In my opinion, the primary reasons for the NPC position are:

a) There would appear to be large quantities of petroleum in the continental margins. Although they do not rule out the deep sea floor as a possible source of petroleum reserves, the amount per unit area will be less and the technology for exploitation is sometime off.

b) Some form of stable legal regime is necessary before the industry could be expected to make the large investments necessary to develop these resources. Since the present regime of national jurisdiction has led to successful development of offshore resources, it seems better to go with a known system that has worked than an unknown system which no one has yet adequately described.

c) The U.S. has large continental margins, and although our gain in potential resources may not be proportionately as large as some other countries, we will fare rather well under the NPC proposal. It has also been suggested that the large international petroleum corporations will gain a U.S. tax advantage under the NPC proposal (19).

The NPC buttresses their position with two arguments. The first is that such an extension of national jurisdiction can be implied from the history of the discussion leading to the continental shelf convention and from the convention itself. The second is that a distinctly different geology differentiates the deep ocean floor from the continental land masses. The history and interpretation of the continental shelf convention has undergone intense legal debate and study recently, and although there are many shades of opinion, it is widely (but far from universally) concluded that the NPC position cannot be sustained as a simple extension of the exploitability clause of the convention (20).

As to the geological argument, there is little disagreement about the nature of the geologic differences between the continents and the deep oceans, but I fail to see what this geologic distinction has to do with national jurisdiction. Mountain ranges, rivers, and other natural boundaries do at times determine political boundaries, but those boundaries have been arrived at by more pragmatic reasons than their geologic implications. We may not know as much as we would like about the boundary between the continental land masses and the ocean floor, but current global tectonic literature suggests that the boundaries are complex, they will be of a different nature in different parts of the world, and they will be discernable only by highly sophisticated, indirect, and complex scientific observations and reasoning (21). How does one apply political significance to a boundary that is so difficult to describe? The NPC proposal anticipates this problem by suggesting that a group of experts in cooperation with the interested countries draw the boundaries as best they can.

In my opinion the position of the petroleum industry must be argued on the basis of self-interest.

that neither the geological argument nor the extension of the continental shelf convention argument can be used effectively to substantiate its position. The geological argument is at best ad hoc and has little in the way of historical precedence to recommend it. In addition it would be exceedingly complicated to apply. There is sufficient disagreement, both within the U.S. and within the world community, about the interpretation of the exploitability clause in the continental shelf convention to suggest that it would be unwise to base the petroleum case on this argument alone.

Of the various parts of the NPC position, the recommendation of doing nothing about a high sea regime at this time would appear to be the weakest. As is discussed in the next section, a high sea regime is important to the hard mineral industry. Furthermore, there are many who argue that the question of limits of national jurisdiction is so closely linked to the nature of the high seas regime that one cannot be discussed without the other. Regardless of the merits of this argument, it seems unlikely that the U.S. can push for a further extension of the sea bed of national jurisdiction without at least agreeing in principle to some form of international regime of the sea bed beyond.

Those who argue against the NPC proposal suggest that if a suitable deep sea bed regime were established that encouraged resource development and was suitably buffered from the worst of the instabilities that sometime occur in international organizations, it wouldn't make much difference to the U.S. petroleum industry where the line was drawn. Furthermore the political stability problem in many of the countries where the petroleum industry must operate is not all that great, and a well-run international organization would be a better alternative. The industry's answer would seem to be in two parts. First, the petroleum industry has had a long experience in dealing with individual governments, and although no one is underestimating the difficulties, they are at least known. Considering the heavy investments and long lead times, it is scarcely prudent to opt for an international regime about which no one can tell us anything very specific as to how it would operate. We are doing all right as we are, why change? The second part of the answer is that for the foreseeable future the petroleum industry will have to deal with the coastal state anyway. The drilling may be on the high seas but there is an umbilical cord of varying complexity that connects the operation to the shore. Pipe lines, tank farms, supplies, housing and port facilities are all part of an offshore drilling operation. Arrangements for these must be negotiated with the coastal state. Perhaps some day in the future our offshore drilling operation can be divorced from the land, but that day is sometime off. In the meantime, the petroleum industry will have to cope with both the international organization and the coastal government. In such circumstances, industry problems may be not just twice as many but three or four times as many.

Independent of any reservations I may have concerning the basis for the NPC position, I am concerned about the consequences of such arrangements. The four 1958 law of the sea conventions are mutually independent, but history suggests that they cannot be treated independently. For example, the width of the continental shelf of Peru, Ecuador and Chile averages about six miles and rarely extends as far as 30 miles offshore. They have little hope of finding large offshore oil resources. Peru and Ecuador have claimed a territorial sea of 200 miles and exclusive jurisdiction over what is presently the world's largest volume fishery, and Peru has used its narrow continental shelf as a justification of its claim.

listen to the debates within the United Nations' family in the last few years to learn that an increasing number of countries no longer draw a fine line between territorial sea and the continental shelf when considering scientific exploration.

There are those who argue that it is unwise to generalize from such isolated examples (23). On the basis of the record to date their arguments are persuasive. My own opinion is that these isolated examples are the portents of the future. National jurisdiction over the resources of the sea bed cannot be considered independent of other activities that take place in the water column above. The collection of these sea bed resources is not done by tunneling out from shore, but by working in and over the water column; thus the regulation of some aspects of this industry must be subject to international jurisdiction, if indeed the work is done on the high seas.

I am uncertain as to whether the present IMCO regulations on safety of life at sea, international rules of the road, and pollution are sufficient to deal with the increasing number of "things" that sit on the high seas pumping oil from a sea bed of national jurisdiction. Present U.S. practice suggests that offshore oil rigs do not come under IMCO rules and there is certainly little in any of the IMCO regulations that would appear to apply explicitly to offshore oil platforms. To date, IMCO recommendations have been limited to fire safety and life safety equipment for offshore platforms. In the absence of international regulations and in the face of the necessity of developing reasonable rules (such as the safety, lighting, and pollution abatement requirements for offshore oil platforms) local regulations are developed. In this manner national jurisdiction does get extended. When all that one saw at sea were ships it was easier to develop complex jurisdictional arrangements. If those who speak of ocean technology of the 21st century are only partly correct, these monstrous platforms will be only the first of a series of problems that will tax the ingenuity of those who wish the resources of the sea floor to be under national jurisdiction and the water column above to be international.

Hard Minerals: The interest of the hard mineral industry in the law of the sea is relatively new. There is little activity at present, but there is growing interest. Interest focuses in both the shallow waters and in the deep ocean. Placer deposits of tin, diamonds, gold and platinum can be found in submerged stream channels. From what is known of changes in sea level in geologic times, it would appear that most deposits of interest would be found adjacent to land masses in depths of less than 200 meters. Thus, any agreed upon regime for the limits of national jurisdiction of the resources of the sea bed would probably satisfy the needs of this segment of the mining industry. At the other extreme is the interest in minerals on the deep ocean floor far enough from the continental margins that it seems inevitable that they will be considered part of the sea floor beyond national jurisdiction regardless of the agreed upon seaward extent of the legal continental shelf. The primary interest of the mining industry in the deep ocean is in manganese nodules which are found in varying amounts on much of the ocean floor. Present economic interest is not so much in the manganese but in the relatively small amounts of copper, nickel, and cobalt that are found in these concentrations. Although manganese nodules are found at all depths, there is some evidence to suggest that the percentage of copper, nickel and cobalt increases with depth. All evidence suggests that manganese nodules vary greatly in concentration per unit area and in relative abundances of different metals. Appreciable differences in metallic content have been found.

short distances (17). The American Mining Congress which often serves as the spokesman for the mining industry has recently formulated a position on undersea mineral resources (24). In essence it calls for a precise definition of the boundary between national and international jurisdiction, formulation of improved rules by nations for areas under its jurisdiction, and development at the "earliest possible time" of more precise international arrangements and legal concepts for the development of deep ocean mining.

The AMC statement contains a sense of urgency about the need for international arrangements beyond the limits of national jurisdiction that is not found in the reports of such groups as the Section of Natural Resource Law of the American Bar Association and the Committee on Deep Sea Mineral Resources of the American Branch of the International Law Association, both of which have expressed themselves on law of the sea matters (25). This difference may be simply a reflection of the one to two year period since the previous reports. Perhaps it is also a reflection of differences of opinion of the different groups (26).

Now that a new law of the sea conference is inevitable, it can be expected that the hard mineral industries will make a concerted effort to develop further their position concerning the details of any international regime. However, one of the problems they face is that there may as yet be insufficient knowledge about the nature of the resources to guide them in their effort. For example, data on the extent to which nodule deposits vary in the relative amounts of copper, nickel and cobalt is of relatively recent origin, and information on the ocean's distribution of nodules in the deep ocean is still incomplete.

Manganese nodules are the resource which generates the most interest; however, the discovery in the Red Sea a few years back of heavy brines and metalliferous muds rich in copper, zinc, lead, gold and silver has led at least one company to seriously consider economic extraction (27). The origin of these brines is still sufficiently obscure that oceanographers are uncertain as to whether the Red Sea deposits are unique or whether they may be related in some way to crustal rifts and thus might be expected to occur in other areas such as the Gulf of California, the Gulf of Aqaba or even the Mid-Atlantic Ridge (17).

Until these and other questions are answered it is difficult for the mining industry to develop a detailed position. By comparison, the knowledge of the petroleum industry is very complete concerning factors which determine petroleum resources.

The preamble to the AMC statement makes note of this problem of insufficient information "Whether and when these (deep sea minerals) prove to be economically recoverable is dependent (in part) on expanded knowledge of ocean environments and related technology." The AMC statement also notes "The ocean environment is largely unknown. The mining industry urges national and international efforts toward enlarging man's knowledge of earth's last frontier. A sound technology for ocean mining can be developed by industry only after the characteristics of this environment are measured and better understood. To this end there should be freedom of scientific and industrial research and exploration of the sea bed beyond the limits of national jurisdiction."

TRANSPORTATION

Although there may be some instances when the interests of those who depend upon ocean transportation differ from those of the transportation industry, I have not been able to think of any substantial ones which are affected by the law of the sea. Nor do I know of any that would separate one part of the industry from another. Whether it be container ships, tramp freighters, or jumbo tankers, the objectives are similar: to move goods as simply, quickly, cheaply and safely as possible. Since all coastal nations depend upon ocean trade, it is unlikely that the transportation interests of any nation will differ markedly from others. What will occur is that those nations, such as Japan and England, which are heavily dependent upon ocean transportation, will give this interest a higher priority than it will receive in some other countries.

Ocean transportation continues to grow. Air transportation can compete in the movement of perishable and high value per pound material, but all other items go by sea. By weight nearly all of the world's goods which move across the ocean go by ship, and world shipping has doubled in the past decade. Shipping to and from the U.S. has increased 60% in the same period. It is also of interest that while about 90% of U.S. foreign trade is by ship, less than six percent is carried by U.S. flag vessels (28). There seems little on the technological horizon that suggests that shipping will not continue to grow. Bulk carriers continue to grow in size, and offshore loading terminals may become increasingly common. High speed surface effects craft and nuclear driven submarine tankers are possible in the future.

In the ideal world of the transportation industry all oil wells would be on shore, no fish would lure draggers to sea, pleasure boats would be limited to small lakes, and oceanographers would be kept ashore. All coasts would be well charted and navigational aids would be abundant. In such a world the transportation industry would get on with the job it has been doing for centuries, moving goods back and forth and ignoring insofar as possible any "secondary" uses others might make of the ocean.

In any law of the sea conference one can expect the transportation industry to attempt to block erosion of the present rule on innocent passage. Assuming the rights of free and innocent passage are established, the most important thing is that the passage be safe. Larger ships and increased offshore activity suggests the need for better regulations. It is a moot point whether this can best be accomplished with a narrow or wide territorial sea, contiguous zone and continental shelf. A nation with a wide territorial sea may feel more obliged to furnish better charts and navigational aids for this area and to regulate activity which might mitigate against safe and efficient transportation. On the other hand, unilateral claims such as Canada's 100 mile pollution zone, can, in effect, prohibit certain types of ships from the area. A major problem could develop for the transportation industry if other nations follow Canada's lead, but with no uniformity of regulations (29). The transportation industry can be expected to be wary of any international regime for mineral exploitation or any convention on scientific exploration which does not adequately insure the safe and efficient movement of goods.

Although the ocean transportation industry is important to the U.S., it would appear that it is less well organized (or at least more segmented) than the DOD or the fishing and petroleum industries. It is to be expected

however, that U.S. transportation interests will be supported by those nations where the transportation industry plays a strong role in developing national policy.

MARINE SCIENCE

The marine science community is heterogeneous. Scientists are a part of most of the interest groups previously discussed. As individuals they may or may not agree with their industry's position. However, all are part of a larger community of scientists, and the interest of the science community is probably best expressed by the academic scientist and those groups and organizations that are a part of the International Council of Scientific Unions. The goal of the marine scientist is to describe and to understand the ocean world. This kind of science knows no political boundaries.

Perhaps one of the difficulties marine scientists have at present is that they have been spoiled. Until recently they were free to travel anywhere on the ocean and make whatever observations and collect whatever samples they wished. A hundred years ago scientists did the same on land. They could trace the head waters of the Nile, explore Inca ruins, dig for Troy, study the geology of the Alps all without passports or visas and little concern for formal political interference. It has been a long time since scientists could move about the land at will, but until very recently it has been possible to do so on the seas.

Many marine scientists trace their present difficulties to the 1958 Geneva Convention, where the concerns of science were not explicitly treated. There is no mention of science in either the Convention on the High Seas or the Convention on Territorial Seas and the Contiguous Zone. Many hope that high on the list of topics to be discussed at any future law of the sea conference will be a convention on sciences. However, others fear that a science convention acceptable to a majority of the UN would be more constraining than the existing situation.

The one mention of science is in the Convention on the Continental Shelf: "the consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless, the coastal state shall not normally withhold its consent....." assuming it is "pure scientific research" and the coastal state can participate or be represented.

The U.S. position has been that research on the continental shelf means physical contact with the shelf. However, this interpretation is not universally accepted. There is a further difficulty of interpretation over what constitutes pure scientific research. As I have argued on previous occasions, the line between pure or fundamental scientific research (i.e., research for scientific truth) and applied research (i.e., research for scientific knowledge applicable to national security or to resource exploitation) is not an easy one to define at times (30). The scientific skills and techniques are often identical; at times judgement must be made on the basis of the explicit or implied intent of the group doing the research. The basis for such a decision is often resolved by noting who is doing the work. If it is a government fishery vessel or an oil company's geophysical research team, then it is assumed that the research is not pure. If it is a university operated vessel, then perhaps the research is "pure".

A regulation where the interpretation hinges on intent is not an easy regulation to enforce in any objective manner. The matter is further blurred when the same research ship will engage in pure research one month and classified military research the next; when university professors serve as consultants to oil companies; and where the Office of Naval Research supports a large share of the pure oceanographic research in this country.

Many U.S. scientists would like to interpret "pure research" as research, the data, samples and results of which are available to all. Since most marine research is of at least peripheral interest to those interested in resource exploitation or military security, they would make the operational definition of whether the research is "pure scientific research" rest on the extent to which the research results are open to the international scientific community.

One difficulty in establishing such an operational definition is the time lag between the collection of the information at sea and the publication of the results, or even the availability of the data in a form generally useful to others. Some non-scientists do not understand the need for any delay. Too often scientists have not helped their cause by taking longer than necessary to make the data and results available. Many LDC's worry that so-called pure research is little more than a cover for resource evaluation which will lead to a resource grab. Any delay in making data and results generally available strengthens their conviction.

At the Sixth Session of the IOC in 1969 a resolution embodying this concept of pure research was nearly unanimously accepted by the delegates present (31). It is too early to tell what affect this resolution will have. Nowhere does IOC resolution VI-13 refer to the continental shelf or the territorial sea. Rather the resolution is aimed at facilitating fundamental scientific research in "areas of national jurisdiction".

The major oceanographic countries have the most to gain from the successful implementation of such a resolution. U.S. oceanographic vessels can be expected to work off the coasts of other nations far more frequently than we will find foreign ships off our coasts. The National Academy of Sciences Committee on Oceanography has proposed unilateral action by the United States to encourage scientific research and exploration of those portions of the ocean and sea bed under U.S. jurisdiction (32). They have suggested the U.S. require assurances, essentially the same, but not identical to those in the IOC resolution, and if these are forthcoming, to allow any scientific research vessel to operate in our territorial sea or on our continental shelf. Their argument is that any information collected will be available and of use to the U.S. scientific community.

Apparently, there are sufficient legal impediments at present that such a policy will require congressional action. The marine science community will watch with interest the fate of such proposed legislation since it will provide them with a measure of how their interests conflict with those of others. If there is little opposition, then there is hope the U.S. might go to a law of the sea conference with a strong position on freedom of scientific research. On the other hand, if scientists cannot get support for their position within the U.S., the future looks dismal. If the U.S. is not willing to agree to freedom of research in areas of its national jurisdiction, how can it expect that other coastal states, with less formidable scientific establishments, will view foreign research vessels off their coasts with anything but suspicion?

I think the scientific community is justifiably worried. It may be argued that agreement on a narrow territorial sea and sea bed of national jurisdiction will leave most of the ocean open for research, but the August 1970 U.S. Working Paper on the International Sea Bed Area confuses research and exploration in the same way as does the Outer Continental Shelf Lands Act and the Continental Shelf Convention. If adopted in its present form it is possible that scientific research in the deep ocean will be restricted (33).

INTELLIGENCE

I can only speculate about the interests of intelligence groups, but it does seem useful to treat them separately from the traditional DOD establishment, because, even though intelligence has little relevance except as a service for the DOD, the ocean interests of the two groups are not necessarily identical. I should think that like the science community, intelligence is interested in complete freedom of the seas. Assuming for a moment that all coastal nations have something to hide off their shores, whether it be detailed bathymetric information or the details of coastal shipping, such information is of greater importance to a strong naval power than a weak one. As the country with the strongest navy, I should think the U.S. intelligence community would be willing to have the narrowest of territorial seas and the fewest restrictions on activities in the territorial sea in return for similar concessions from other nations. I should think there would also be an additional advantage in such an arrangement for an open society. Much information that we might wish to keep hidden by establishing a wide territorial sea is available in other ways. The reverse is less likely to be true. It is more difficult to collect similar information by legitimate means in such countries as the U.S.S.R.

Intelligence information is gathered in many ways. Science sometimes finds itself in a partnership not of its own choosing. It is one thing to undergo routine questioning after attending an international scientific meeting. It is something else to find that a ship operating out of the southern part of Florida satisfies the inquiries of the curious by indicating it is an oceanographic research vessel working for the University of Miami, when it is not, or that the Captain of the electronic intelligence vessel PUEBLO claims when captured off North Korea that they were merely engaged in oceanographic research. PUEBLO class vessels were listed by the Navy as Environmental Research Ships (4).

It is probably true that the only two major interest groups in the U.S. that would like complete freedom of the seas are the science community and the intelligence community. It is probably also true that science might have a better chance of advancing its cause, if the similarity of its interests and those of the intelligence community were not so obvious to all concerned. On the one hand, U.S. scientists can expect little support of their position by most other nations. On the other hand, it is not clear that intelligence will have that much influence when it comes to arriving at a U.S. position. It has always seemed to me that the U.S. is a bit embarrassed that it needs and has an intelligence service. Unless the intelligence community can convince the government that a very narrow territorial sea is an important element of our national security effort (and it seems unlikely that they can), my guess is they will be told to get their information elsewhere. The PUEBLO class vessels have been stricken the other two Environmental Research Ships (4).

CONSERVATION AND POLLUTION

There are those who believe that the present interest in ecology and pollution is of transient political importance. I am not among them. Much of the emotional element may be removed in time, but I believe we are witnessing the beginning of a profound shift in the way man views his life on this planet and nowhere will this shift be more evident than in highly industrialized states such as the U.S. Ultimately the "conservation interests" in the U.S. may be amongst the most powerful in shaping the U.S. position in any future law of the sea conference.

The capacity of the ocean to assimilate wastes is enormous (there is one square mile of ocean, 500 feet thick, for every person alive on the earth today), but this does not mean that the ocean capacity is infinite. The resources of the ocean are often referred to as the heritage of all mankind. The greatest ocean resource of all is that it sustains life on this earth. No one knows the effect on the ocean of having to cope indefinitely with the consequences of at least four billion people with the life style and standard of living practiced and anticipated in the U.S.

Although the effects of pollution are well documented in large fresh-water bodies such as the Great Lakes and in semi-enclosed ocean areas such as certain parts of the Baltic Sea, there is very little factual information on possible pollution in the open ocean (34). One of the goals of the International Decade of Ocean Exploration is to determine the extent and effects of ocean pollution today and the capacity of the oceans to assimilate waste material in the future.

The conservationists are becoming more vocal and better organized, and there is little doubt but what they are being listened to. The recent report to the President on ocean dumping by the Council on Environmental Quality recommended stopping almost all forms of waste material from entering the ocean (35). It is a report which should satisfy even the most militant conservationists, but the extent to which such recommendations will be implemented remains to be seen. The cost of not dumping may be very high. There is the further problem that waste material must be put somewhere. Material not disposed of in the ocean must be deposited on land. One might hope that the economic incentives of this nation and the world can be manipulated to minimize pollution rather than maximize it, but until such a major restructuring of economic goals is accepted, ocean pollution may continue to be a growing factor in the law of the sea.

Presently, coastal states are taking unilateral action. Canada has adopted a 100 mile pollution zone in Arctic waters (36). The U.S. is adopting more stringent regulations for its own citizens who dump material in international waters off its coast (37). I believe it is in the long-term best interests of those who pollute that technically developed coastal states take such unilateral action. I am less sure it is in the best interests of the conservationists. Whatever regulations are ultimately adopted in the U.S. and other technologically developed nations will be the result of political compromises in which the cost of non-pollution will play a large role. The regulations could very well be less stringent than those adopted by international agreement. Until now the LDC's have shown little interest in matters of pollution. They are much more concerned with raising agricultural productivity than in the consequences of DDT (34). Pollution, other than local sanitary problems, is a consequence of a high standard of living. Their attitude

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Since pollution control in those countries is minimal, it is probably true that most LDC's have a higher pollution rate per unit of gross national product than do those technically developed countries that exercise some measure of pollution control. On the other hand the pollution rate per capita in most lesser developed countries must be less than in the technically developed countries.

For those states that will reach some level of economic parity with the developed countries in the 21st century, there might be a very natural concern that a major part of their newly found affluence will have to be devoted to cleaning up the previous century's Augean Stable. Thus there might be a move amongst the LDC's to develop stronger international pollution regulations if the standards were somehow tied to population rather than economic activity. As minimal polluters they would find such regulations easier to live with than will the developed countries. In this way the LDC's might join forces with the conservation interests in the U.S. and elsewhere. Elements of such a position would perhaps include stiffer international regulation of pollution on the high seas including offshore oil platforms and a monitoring and inspection network. One extreme might be a move toward a minimum width to the territorial sea coupled with international standards for the high seas and a monitoring system fringing the territorial seas to insure that coastal states do not violate international standards. Such a program would, in effect, control the level of pollution by the coastal state. Although the U.S. might find difficulty in abiding by such a regime, its problem would be relatively simple compared to nations such as Japan, England and the Benelux countries which are developed, have higher population densities than the U.S. and fewer alternatives for waste disposal.

LONG-TERM U.S. INTERESTS

The arguments presented thus far do not represent the sum of the U.S. interests in the ocean. I would like to suggest that the U.S. has, or should have, other long-term goals in which the ocean can play a part. The first has to do with the growing income gap between the developed and developing countries. By whatever criteria one wishes to employ, material wealth, education, energy use or resource use, the absolute difference between the developed and developing nations increases even though the rate of growth for some of the LDC's may be larger. I am among those who think it is imperative for the future well being of this country, let alone the developing world, that something be done to change this pattern. I believe that most of the economic rent of the oceans should go to the developing world as a means of possibly helping them catch up with the developed. Of the alternatives, I think it preferable to accept the illusion that the resources are international and thus the wealth derived therefrom should flow naturally into the developing world through international machinery. A counter alternative is to accept the illusion that resources are national and that the developed countries should meet their commitments by increasing their foreign aid. I use the term "illusion" advisedly. Having heard the arguments on both sides, I think the truth is what we wish it to be. A good case can be made either way. The question is what is in the best interests of the U.S. and I would argue that it is in our best interests to agree that most of the ocean resources be treated as belonging to the international community. Even if one were to assume that the U.S. and other developed countries would adopt a long-term policy of providing sufficient foreign aid such that the net distribution of wealth would be the same, I believe the dignity and future

relations of both the giver and the receiver are better served if we accept the first alternative. I have no way of proving such a statement, although there is considerable evidence on the human scale which suggests it is true. There is less experience and nothing I am aware of in the way of documentation to suggest that the same holds among nations. Nor do I wish to imply that the wealth derived from the exploitation of ocean resources is sufficient to the task. Additional sources of foreign aid will be required for the foreseeable future.

Secondly, I believe it is in the long-term interest of the U.S. to strengthen rather than weaken international regulatory machinery. The U.S. has less influence in the U.N. than it used to and there is little reason to believe the trend will change. However, the alternatives to stronger international organizations to deal with such things as pollution, population control and nuclear inspection are not very attractive either. The richest nation in the world has the most to lose if the problems of this planet are not solved in a rational manner. An effective international regime for regulating ocean resource use and development does not in itself address these other problems. However, if such a system can be made to work for the oceans, it perhaps builds confidence as well as experience in developing international mechanisms for dealing with more politically explosive problems.

ELEMENTS OF A POSSIBLE U.S. POSITION

I suggest the following points should be ^{considered?} controlling in the development of a U.S. position for the law of the sea conferences. Some are part of the conventional wisdom; one or two perhaps are not.

- 1) The freedom to move warships, including submarines, on the high seas must be maintained.
- 2) Some portion of international straits and narrow seas must have the status of high seas insofar as the movement of warships, including submarines, are concerned. The width of the territorial sea is of secondary importance in regions where the coastal state fronts on the open ocean. If necessary the U.S. can live with a 200 mile territorial sea off Peru. It cannot accept 200 mile territorial seas for those countries bordering the Mediterranean.
- 3) We should opt for a resource management plan which gives the greatest assurance of the rational development and management on a world wide basis for fisheries and mineral resources. The fisheries problem is more acute, and probably more difficult to solve, than that of mineral resources.
- 4) The resource management system for both fisheries and mineral resources should be such as to aid in closing the income gap between developed and developing countries.
- 5) Scientific research should be encouraged. There should be no unnecessary impediments to its prosecution.
- 6) The U.S. should urge a strong and reasonably unambiguous pollution control convention which includes provisions for international monitoring and enforcement. As the most technologically advanced nation in the world, I think we owe it to the future generations of all nations to adopt such a

position. Although the U.S. might experience initial difficulty in abiding by the agreed upon regulations, our large land area and low population density should make it easier for us than any other technically advanced country with the possible exception of the U.S.S.R. The U.S. has a better opportunity to exercise leadership at this time than will be possible when an increasing number of nations will be aware of the complexities of the problem. Hopefully a convention can be written now that will not require reopening in ten years.

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Elizabeth Mann Borgese, in reviewing the Malta Conference, Pacem In Maribus, wrote in the Saturday Review that some years ago the Center for the Study of Democratic Institutions decided "that Oceanography had become too important to be left to oceanographers" (38). My only rebuttal is that thinking grand thoughts is too much fun to be left entirely to the people in Santa Barbara. I am not prepared to offer a detailed proposal, but it is nearly impossible to conduct a review such as this without generating a few ideas on this subject.

I am not optimistic that these ideas will find wide favor and I am aware of at least some of the very major obstacles to their acceptance. However, I am also persuaded that agreement on all matters of substance are going to be exceedingly difficult at the next law of the sea conference.

In large part, the present conventions are a codification of existing practices as of 1958. In such matters as the breadth of the territorial sea where there was insufficient agreement on the established norm, the issue was left unresolved. If anything there is less agreement on the established norms today than there was in 1958. As ocean use intensifies, the problems of agreement become greater. Thus, perhaps a fresh look is useful simply as an intellectual exercise. Within the framework of my proposal one could embody the six elements of U.S. policy noted above.

The key is a three-stage regime similar in some ways to that put forth by Henkin, the Stratton Commission and the State Department in its Working Paper (39,33). There is a territorial sea and there is the high seas, and in between a middle zone which, following the Stratton Commission, I will call the intermediate zone. Unlike the proposals of the previous report, however, I believe the intermediate zone should include fisheries as well as mineral resources. I also believe the inner edge of the intermediate zone should correspond to the edge of the territorial sea, not the 200 m isobath.

Twenty years ago when there was only merchant transport, a seemingly infinite supply of fish, and a few tentative offshore oil wells, it perhaps made sense to consider separate geographical jurisdictions for each ocean use. I am sure new solutions can be found for today's technology which perpetuates the distinction between territorial sea, fisheries zones, pollution zones, and sea beds of national jurisdiction. But I believe such solutions are unwise. They will address themselves to current practice. Manned ocean bottom habitats, pollution of international fisheries by exploiters of mineral resources belonging to the coastal state, floating or anchored airports, recreational submarines and ocean uses as yet undreamed of, all indicate that the water, the resources, and the sea bottom are intimately related and that interrelationship will grow as man finds new ways to use the ocean.

What is required is a regime that, if possible, will stand the test of time better than have those of the 1958 conventions. I believe that insofar as is possible, the U.S. should treat the sea bed, the water above, and the resources within the sea bed and water as part of the same regime. I believe any other solution is destabilizing over the long term. Man's use of the oceans is developing at too rapid a pace to indulge in ad hoc solutions to ocean use problems.

1. Territorial Sea: There would appear to be little need to modify the present territorial sea convention as long as agreement can be reached on its width and as long as the width does not close off straits and narrow seas. This could be accomplished if the agreed-upon width were x miles or y percent of the distance to the median line between two land masses, whichever is less. If x were 20 miles and y were $66\frac{2}{3}\%$, the width of the territorial sea would be 20 miles everywhere except where the distance between land was less than 60 miles. For example, if the straits were 30 miles wide, the territorial sea on either side would be 10 miles and the high seas region between would be 10 miles. Regardless of the distance between land (assuming it were more than some minimum distance such as three miles) some portion would be international. If the U.S. could reach agreement on such a formula, the values assigned to x and y are less critical.

2. Intermediate Zone: Between the territorial sea regime and the high sea regime is a third regime, the intermediate zone. It would blend some of the rights and responsibilities of the coastal states in the territorial sea regime to the international high seas regime. Thus, there would be no constraints on the movement of ships, including warships and research vessels in the intermediate zone. The coastal state, however, would have special rights and responsibilities concerning all resources in the intermediate zone, living resources as well as mineral resources.

The intermediate zone would begin at the edge of the territorial sea, not the 200 m isobath, and extend perhaps 200 miles or to where the water was 2000 m deep, whichever is farther. In cases where this leads to "overlapping" intermediate zones, each coastal state's intermediate zone would extend to the median line dividing the coastal states. To my mind, the critical element in determining the outer limit of the intermediate zone is fisheries, not mineral resources. I think it important that insofar as possible, all major fisheries be within one or another intermediate zone. Further study may suggest a revised definition of the outer limit, but so far as I can determine all major fish catches except tuna and whales are, or could be, made within the intermediate zone, if one accepts the further proviso that all anadromous fish such as salmon are caught as they move into their home coastal waters.

It is true that fish stocks move up and down the coast, and would thus pass from the intermediate zone of one coastal state to another. However, I think it is more likely to reach procedural agreements between the concerned coastal states, such as Canada and the U.S., or Mexico and the U.S., or Peru, Chile and Ecuador, than to expect agreements between all those who fish off a given coast now, or might wish to fish there in the future. Special arrangements would continue to be needed for those few fisheries such as whale and tuna that are truly high seas. Whether better conservation arrangements can be made for tuna than for whales remains to be seen. Together they represent a small portion of the total catch and represent a small part of the problem facing world fisheries (40).

The resources in the intermediate zone are international resources. The economic rent to be derived from these resources will be divided between the coastal state and some international agency for assistance of developing nations. The division could be accomplished in a number of ways. It is not my purpose to discuss any in detail, except to note the following: If this proposal seems like an attempt to turn back the clock as it relates to the continental shelf convention (which it is), one could imagine a division whereby the percentage paid to the international agency increases as depth of water and/or distance from shore increases. Furthermore, it may be necessary to use some part of the proceeds from exploitation of living resources over a period of some years to compensate some distance water fishing nations for the loss of "historic fishing rights".

It is not necessary that the coastal state itself exploit the resources in its intermediate zone. It can lease rights to a distant water fishing nation just as it leases the rights to mineral exploitation. The problem is more complicated with respect to living resources since some stocks move up and down the coast from one intermediate zone to another. Agreements must be made on the share of the catch, or the proceeds, each coastal state receives. Since these are international resources, the international community can be expected to exercise some interest with respect to such matters as conservation, efficient management and pollution. This implies at least pro forma inspection which would apply to mineral resources as well as living resources in the intermediate zone. One solution would be to apply identical rules, insofar as possible, for the high seas regime and the intermediate zone with the proviso that the coastal state could add such additional requirements as necessary to carry out the spirit of the high seas regulation as it relates to problems of resource management, conservation, and pollution. However, it is equally important that such an arrangement not lead to undue harassment; for example, the writing of pollution rules which effectively close some intermediate zones to merchant shipping.

The virtue of the interpretation of the intermediate zone proposed is that it is expandable to other uses of the oceans. As uses of the ocean grow, it becomes increasingly evident that one needs for a variety of uses a buffer zone to bridge the territorial sea regime and the high seas regime. One can establish separate geographical limits for separate uses, such as depth of water for the trusteeship zone for mineral resources and one distance from shore for a fisheries contiguous zone and a second distance for pollution control. Alternatively, one can establish a single intermediate zone for all ocean uses, thus establishing three regimes for the ocean. Assuming one can choose wisely the breadth of this intermediate zone, I believe the second alternative is preferable because as man's use of the oceans increases, there will likely be a need for more kinds of intermediate zones in the future. It is possible to have one set of criteria for determining the geographic range of the intermediate zone for fisheries, another for minerals, a third for pollution control, a fourth for environmental monitoring and a fifth and a sixth for such future activities as the deployment of manned ocean bottom habitats and open ocean aquaculture. I question whether it is wise to have separate criteria if there is an acceptable alternative. Many ocean uses interact with one another. The rules developed for one use will affect other uses. For an area that is changing its use patterns as rapidly as the ocean, my intuitive belief is that the more distinct geographic ranges one must deal with, the more unstable the regime and the more likely the need for a third law of the sea conference 15 years after the second.

3. High Seas: Provisions must be made for mineral exploitation in the high seas. Further, it seems likely that a new high seas convention will require more explicit constraints concerning pollution. Finally, it is to be hoped that something reasonable can be worked out concerning management and conservation of high seas fisheries. In all cases there must be a blending of the high seas regimes with those of the intermediate zone.

All of this implies that a future convention on the high seas will be more constraining than the present one. I trust that in the writing of it, freedom of scientific research is not further restricted. The present convention does not specifically include freedom of research as one of those freedoms applying to the high seas. Although it might be assumed that this freedom is one which is recognized by the general principles of international law, my recent experience in the IOC suggests this is not the case (4).

I thus return to where I began, a concern for the future of the freedom of scientific research in the oceans. I can only hope those responsible for preparing the U.S. positions provide specifically for the freedom of scientific research in both the high seas and the intermediate zone, if not the territorial sea.

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